



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

D407-667-205TRN
Job Sheet 169693-A



Part No: D407-667-205TRN

Job Qty: 1 ea

Part Name: Crosstube Turning Detail



Part Weight: 0 lbs

Status: Scheduled

Priority: Medium

Job Created: 12/19/17

DAS

Job Tracking No:

Due Date: 12/22/17

10

Created By: Marie Lajeunesse

Type: Stock

9-89

Description:

Ship Via:

REV G

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea		12/21/17	0.00	0.00	Start Up Crosstubes-2		PMP
100	Mori Seiki	1 pcs		12/21/17	2.49	3.20	Mori Seiki TL-40		PMP
110	QC	1 pcs		12/21/17	0.00	0.00	QC2-2		PMP
120	Mori Seiki	1 pcs		12/21/17	0.00	2.50	Mori Seiki TL-40		PMP
130	QC	1 pcs		12/21/17	0.00	0.00	QC2-2		PMP
140	QC	1 pcs		12/21/17	0.00	0.00	QC8		PMP
145	Crosstubes	1 pcs		12/21/17	0.00	0.65	Crosstubes-2		GP
150	HandFXtube	1 pcs		12/22/17	0.00	0.25	Crosstubes-3		18-04-09
160	QC	1 pcs		12/22/17	0.00	0.00	QC7-3		
170	Packaging	1 pcs		12/22/17	0.00	0.00	Packaging3-2		
180	QC21-SA	1 Ea		12/22/17	0.00	0.00	QC21		21

Part Op 100 - 1-Fill tube with sand & install plugs DT8531 on both ends as per Folio FA248 3-Turn first side as per Folio FA248
Descriptions: 120 - 1-Turn second side as per Folio FA248 4-Scribe part # and batch # using vibrating stylus as per Dwg D407-667-245
145 - Grind off circumferential machining marks longitudinally.
150 - 1- handfinish X-TUBE INSIDE AND OUT 2- ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE
170 - Identify and stock in kanban rack

Job Allocations

Operation	Component Part	Required	Inventory	Allocated	Std Qty
90-Start up Operation	D6011-115	1	59	0	0

B107880

Part Specifications

Specifications could not be found.

DART
AEROSPACE
S029871

Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K64 1K7
CANADA
TEL.: 1 613 632-5200
Email: sales@dartaero.com
www.dartaerospace.com



Crosstube Turning Detail

PART NO: D407-667-205TRN
Revision:
Operation: Start up Operation
Change No:

Mfg Date: 01/08/18

Job No: 169693-A

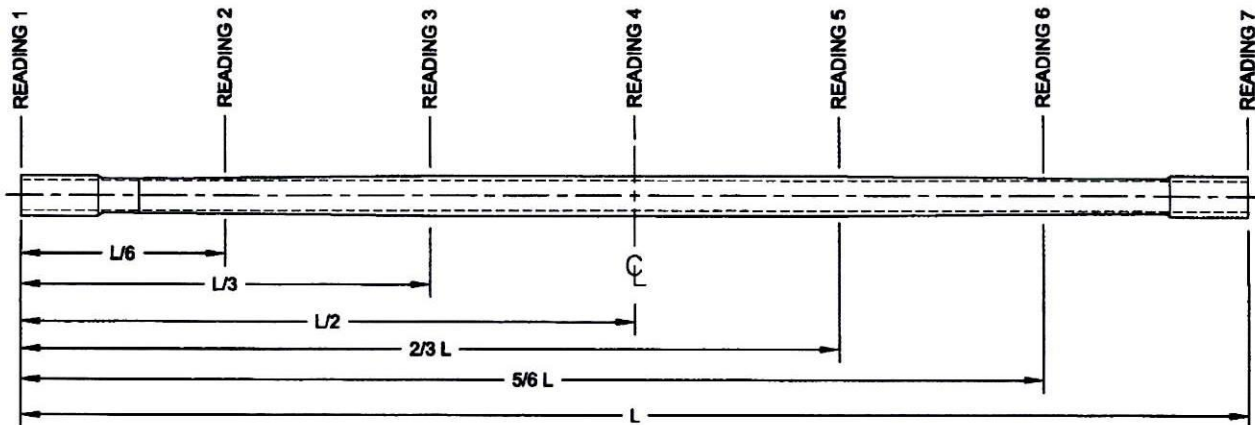
DART AEROSPACE LTD	Work Order: 165693-A
Description: Crosstube Assembly	Part Number: D407-667-245
Inspection Dwg: D407-667-245 Rev: G	Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.490	+0.005/-0.000	2.494	✓		VERNO8	
	1.832	+0.005/-0.000	1.837	✓			
	1.838	+0.005/-0.000	1.843	✓			
	1.892	+0.005/-0.000	1.897	✓			
	2.052	+0.005/-0.000	2.058	✓			
	2.206	+0.005/-0.000	2.209	✓			
	2.521	+0.005/-0.000	2.523	✓			
	2.633	+0.005/-0.000	2.635	✓			
	4.10	+/-0.030	4.128	✓			
	4.978	+/-0.030	4.998	✓			
	2.040	+0.000/-0.010	2.0335	✓			
	0.125	+/-0.010	.127	✓			
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		RG	
	2.490	+0.005/-0.000	2.492	✓		VERNO8	
SIDE B	1.832	+0.005/-0.000	1.835	✓			
	1.838	+0.005/-0.000	1.840	✓			
	1.892	+0.005/-0.000	1.894	✓			
	2.052	+0.005/-0.000	2.054	✓			
	2.206	+0.005/-0.000	2.211 SC	✓			
	2.521	+0.005/-0.000	2.525 SC	✓			
	2.633	+0.005/-0.000	2.637 SC	✓			
	4.10	+/-0.030	4.124	✓			
	4.978	+/-0.030	4.991	✓			
	2.040	+0.000/-0.010	2.034	✓			
	0.125	+/-0.010	.128	✓			
	R0.063	+/-0.010	.063	✓		RG	
	R0.500	+/-0.010	.500	✓		RG	
	112.91	+/-0.020	112.910	✓		TAPE	

DART AEROSPACE LTD	Work Order: 169693-A
Description: Crosstube Assembly	Part Number: D407-667-245
Inspection Dwg: D407-667-245 Rev: G	Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	229	229	234	240	.011	0.075"
READING 2 L= 18.82	231	201	239	277	.076	
READING 3 L= 37.64	419	378	401	447	.074	
READING 4 L= 56.46	660	634	651	687	.053	
READING 5 L= 75.27	424	387	373	436	.049	
READING 6 L= 94.09	251	216	230	260	.044	
READING 7 L= 112.91	231	229	233	231	.004	

Dwg 44
0.236 0.035

Calibration Result

Actual Block Thickness: 100-750

SITESCAN 250 Measured Thickness: 100-750

Measured by: PMP	Audited by: JTW	Preliminary Approval:
Date: 2018-01-05	Date: 18-03-12	Date:

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-205)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	06.03.30	Tolerance revised for 4.978 dimension	KJ/JLM	
D	07.02.19	Dwg Rev updated	KJ/JLM	
E	09.05.20	Dwg Rev updated	KJ	
F	12.06.04	Wall thickness form added	KJ	
G	15.05.14	Dwg Rev updated	KJ	

Item	QTY -245	PART NUMBER	DESCRIPTION
	X	D407-667-245	CROSSTUBE ASSEMBLY (407 HIGH AFT)
1	1	D6011-115	CROSSTUBE
2	2	D2873-043	NUT PLATE
3	2	D2873-045	NUT PLATE
4	1	D2894-1	SUPPORT
5	2	D3190-1	CHAFING SHIELD
6	2	D3595-063-430	RUBBER CUSHION
7	14	MS20601AD4W8	RIVET (OR NAS9302B-4-8)
8	4	MS21920-22	CLAMP
9	2	MS21920-25	CLAMP (OR MS21920-24)
10	AR	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
11	AR	PROSEAL 890	SEALANT

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6011-115
FINISHED LENGTH = 112.91±0.020
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT CROSSTUBE PER DART QSI 005 4.2
FOR HATCHED AREAS (ZN A8-2), MASK AS REQUIRED
TO APPLY PRIME AND APPLY CLEAR COAT ONLY
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-245" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: 27.7 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2894-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-25 CLAMPS WITH D3595-063-430 RUBBER CUSHIONS TO SECURE D2894-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
NOTE: MS21920-24 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3190-1 CHAFING SHIELDS AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEAL D3190-1 CHAFING SHIELDS ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- INSTALL D3190-1 CHAFING SHIELDS SO THAT OVERLAP IS 50 TO 70 DEGREES FROM BOTTOM OF CROSSTUBE OPPOSITE D2894-1 SUPPORT.
- TORQUE CLAMPS 80 TO 100 IN-LB. TORQUE CLAMPS ON D3190-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

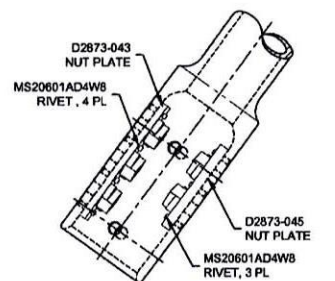
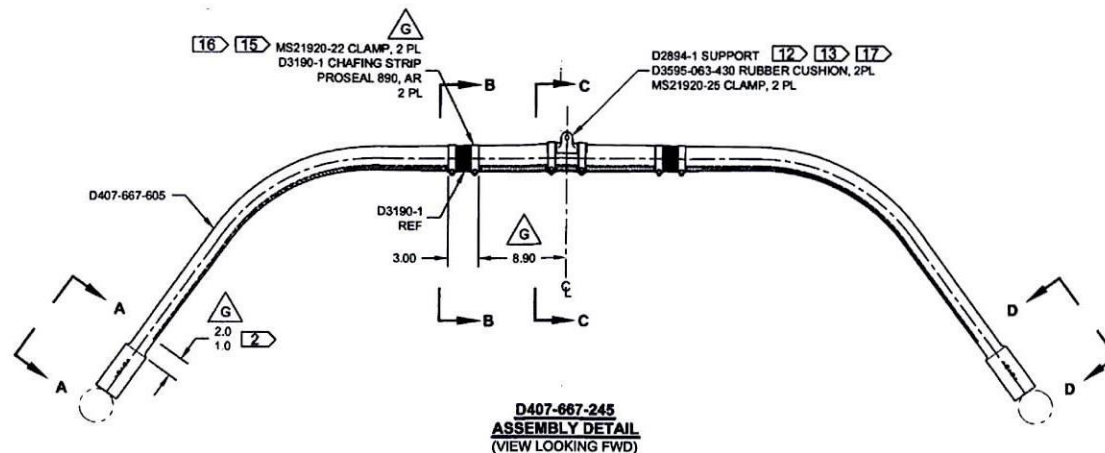
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RETURN TO
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SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 169693-A

G	INCRP. DEO's D407-667-245-F1/F2 (ZN D8-1, A8-1, D5-2, B8-2, C6-2); 8.90 WAS 8.53 (ZN D5-2); TORQUE REDUCED FOR CHAFING SHIELD (ZN A8-1); FINISH REVISED TO ALLOW MANUFAC. FLEXIBILITY (ZN C8-1)	RF	15.03.20
F	REFORMAT NOTES TO NEW STANDARDS (ZN B8-1); RELOCATED FLAG # 6 (ZN A8-3) PER NCR 210; REMOVED REF. & ADD TOLERANCES (ZN C6-3, C4-3 & D2-3)	RF	08.11.06
E	8.02 AND 8.53 WERE 8.40 AND 8.90 (ZN D5-2); REORGANIZED VIEWS AND REFORMATED DRAWING TO CURRENT STANDARDS. REASONS: CLAMPS MOVED 0.375 TOWARD CL TO ELIMINATE INTERFERENCE WITH AIRCRAFT MOUNTS. REFERENCE: PAR#08-21 AND ECN#1225	MB	08.07.24
D	ADD VIEW FOR OEM SKID HOLES, ROTATE ORIENTATION OF CLAMPS SECTION F-F, REMOVE -B51 ABRASION STRIP, ADD MAGNABOND 6398, ADD CUSHION	PH	07.02.07
C	ADD HOLES AND NUT PLATES FOR COMPATIBILITY WITH BHT/AA SKIDTUBES	PH	05.07.26
B	ADD CHAFING SHIELD	CP	03.05.21
A	NEW ISSUE	CP	02.05.13
REV.	DESCRIPTION	BY	DATE
DESIGN	RF		
DRAWN	RF		
CHECKED	RF		
MFG. APPR.	RF		
APPROVED	RF		
DE APPR.	RF		
DATE	15.03.20		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA DRAWING NO. D407-667-245 SHEET 1 OF 4 TITLE CROSSTUBE ASSY (407 HIGH AFT) SCALE NTS COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			

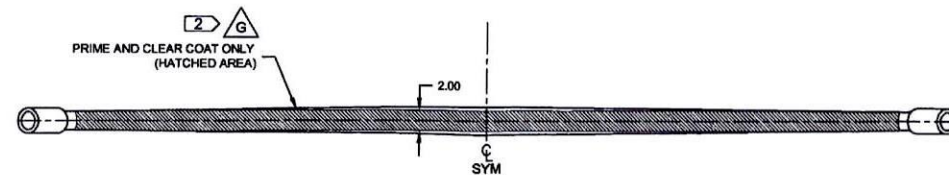
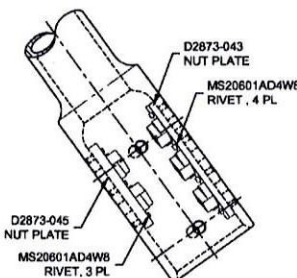
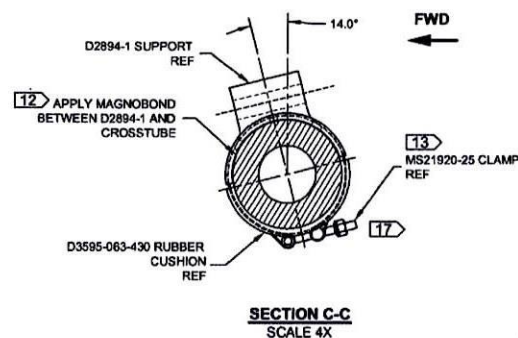
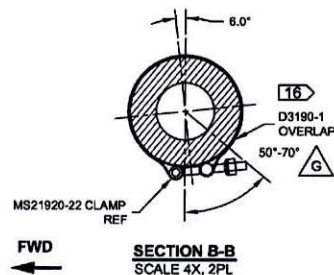
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2015 APR 09

4P ECLN 15-557



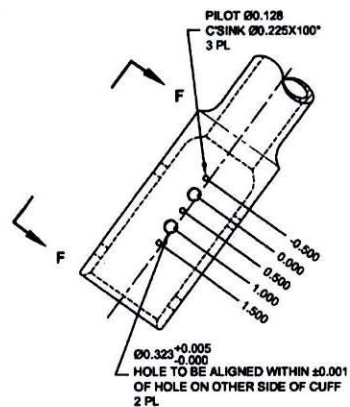
VIEW A-A CUFF DETAIL
SCALE 4X



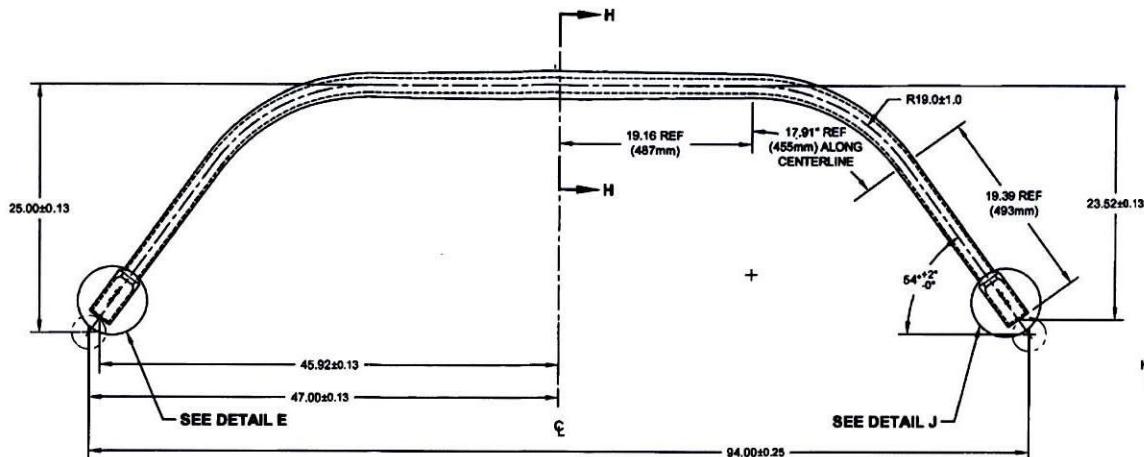
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CHECKED	RF	DRAWING NO.	REV. G
MFG. APPR.	RF	D407-667-245	SHEET 2 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE ASSY (407 HIGH AFT)	NTS
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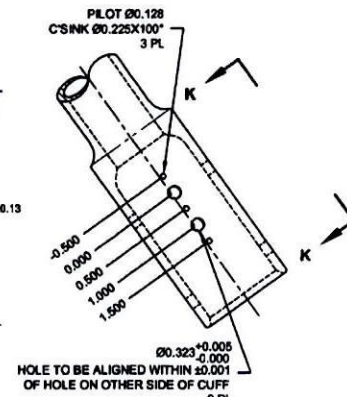
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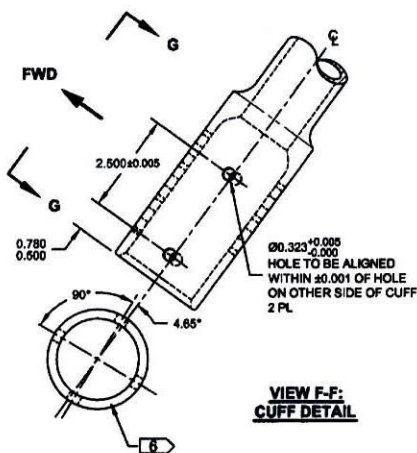
DETAIL E
SCALE 4X
(VIEW LOOKING FWD)



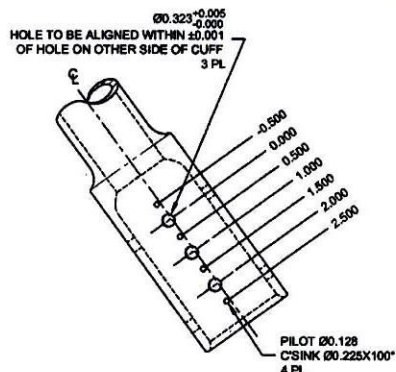
D407-667-605
BENDING AND DRILLING DETAIL
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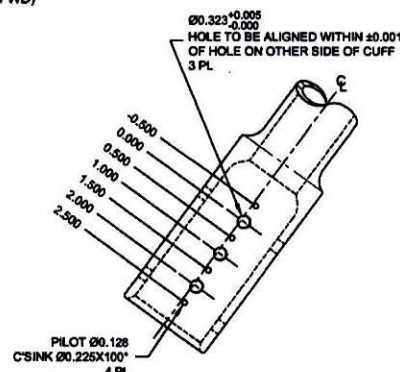
DETAIL J
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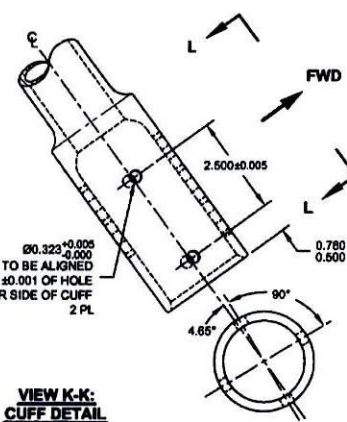
VIEW F-F:
CUFF DETAIL



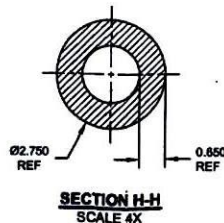
VIEW G-G
(VIEW LOOKING AFT, ROTATED)



VIEW L-L
(VIEW LOOKING AFT, ROTATED)



VIEW K-K:
CUFF DETAIL



SECTION H-H
SCALE 4X

RELEASED

2015 APR 09

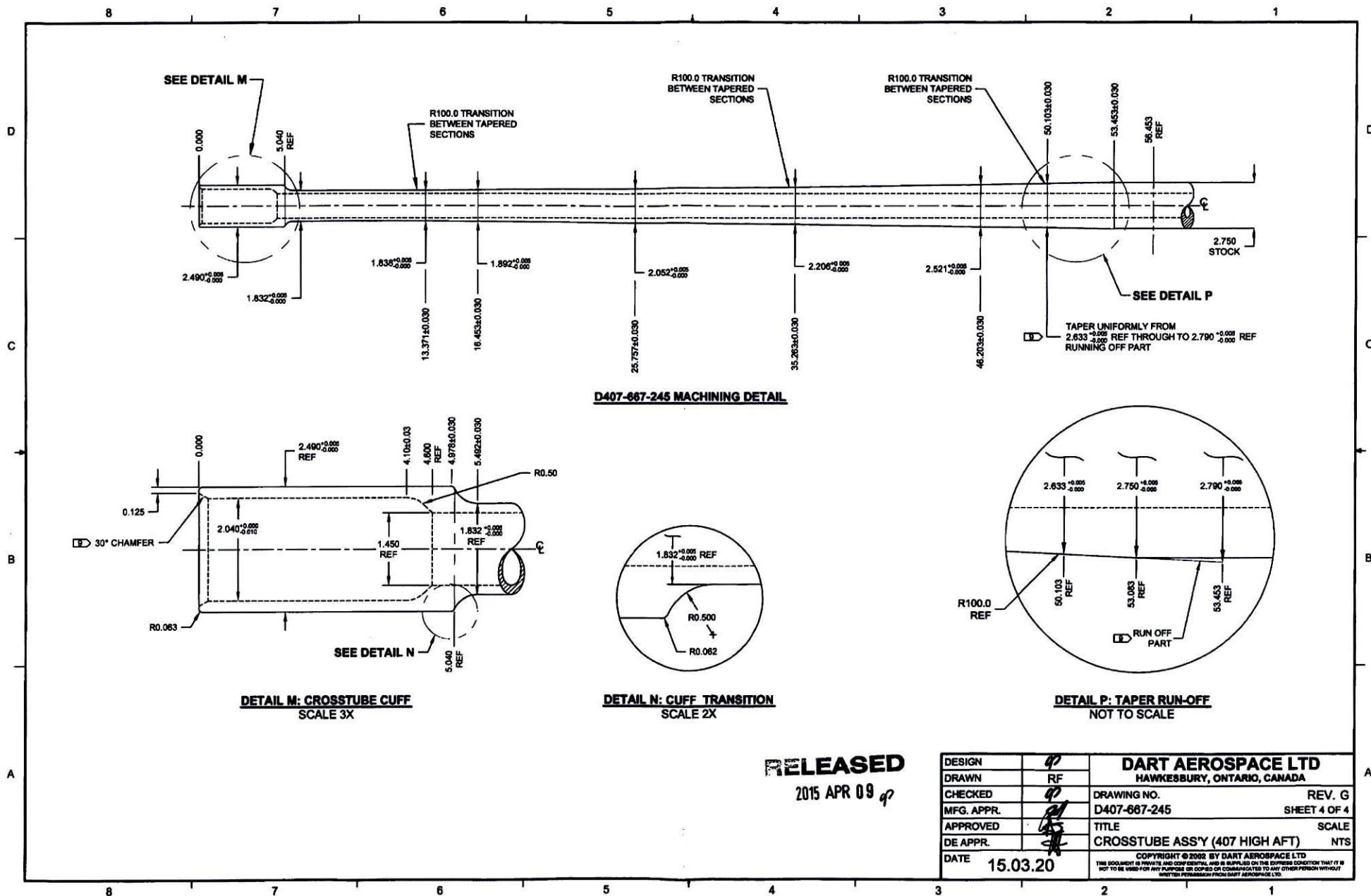
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DE APPR.	40
DATE	15.03.20

DART AEROSPACE LTD
HAWKESBURY, ONTARIO, CANADA

DRAWING NO.	REV. G
D407-667-245	SHEET 3 OF 4
TITLE	SCALE
CROSSTUBE ASS'Y (407 HIGH AFT)	NTS

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8 7 6 5 4 3 2 1



DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☒ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="border: none;">Skid-tube ☐</td> <td style="border: none;">Cross tube ☒</td> <td style="border: none;">Water Jet ☐</td> <td style="border: none;">Engineering ☐</td> </tr> <tr> <td style="border: none;">Machining ☐</td> <td style="border: none;">Small Fab ☐</td> <td style="border: none;">Prod. Eng. Coord. ☐</td> <td style="border: none;">Quality ☐</td> </tr> <tr> <td style="border: none;">Thermoforming ☐</td> <td style="border: none;">Finishing ☐</td> <td style="border: none;">Rec/Store/Packaging ☐</td> <td style="border: none;">Other ☐</td> </tr> <tr> <td style="border: none;">Large Fab ☐</td> <td style="border: none;">Composite ☐</td> <td style="border: none;">Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Cross tube ☒	Water Jet ☐	Engineering ☐																						
Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐																						
Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐																						
Large Fab ☐	Composite ☐	Supplier ☐																							
Date : <u>18/3/2</u>		Step #: <u>100</u>		QTY Effective :		MRB (QSI042) Approval DAS 12 9-89 <u>18/3/2</u>																			
Description Work Order Deviation				Disposition		Completed By DAS 12 9-89 <u>18/3/2</u>																			
<u>Well thickness measurement outside tolerance.</u> <u>Min Well = 0.201, Dwg = 0.236 nominal,</u> <u>Δ = 0.035"</u>				<u>Acceptable.</u> <u>Min Well is within expected tolerance</u> <u>of raw material</u>		Lead hand / Supervisor Approval Verification <u>TW</u> <u>18-03-12</u>																			
Root Cause				FAULT CATEGORY																					
Environment	☐	No Re-verification	☐	Pressure/Forced	☐	Temperature/Cure	☐																		
Design	☐	Operator	☐	Bending	☐	Set-up	☐																		
Doc/Data	☐	Offset/Setup	☐	Centre Not Concentric	☐	BOM/Route	☐																		
Equip/Tooling	☐	Supplier	☐	Cracks	☐	Broken/Damage/Defect	☐																		
Handling/Pre	☐	Training	☐	Crimp/Kink/Ripple/Wave	☐	Inspection Incomplete/Unqualified	☐																		
Material	☐	Use for Testing	☐	Cuffs	☐	Contamination	☐																		
Internal Transport	☐	Poor Information	☐	Crushing	☐	Countersink	☐																		
Tribal Knowledge	☐	Rushing	☐	Heat Treat	☐	Cut Too Short	☐																		
LOA	☐	Product Improvement	☐	Wave/Twist in Tube	☐	Instructions Incomplete/Unclear	☐																		
Substation	☐	Process Improvement	☐	Marks/Chatter	☐	Drill Holes	☐																		
Past Expiry Date	☐	Manufacturing Process	☐	OTHER :																					
Misidentified	☐	Past Due	☐																						